



THE UNIVERSITY *of* EDINBURGH

Edinburgh Research Explorer

Beyond a simple “yes” and “no”

Citation for published version:

Bak, T 2015, 'Beyond a simple “yes” and “no”: A commentary on Paap et al. “Bilingual advantages in executive functioning either do not exist or are restricted to very specific and undetermined circumstances”, Submission to Cortex “Discussion Forum”, *Cortex*. <https://doi.org/10.1016/j.cortex.2015.08.003>

Digital Object Identifier (DOI):

[10.1016/j.cortex.2015.08.003](https://doi.org/10.1016/j.cortex.2015.08.003)

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Peer reviewed version

Published In:

Cortex

General rights

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.



Beyond a simple “yes” and “no”

Thomas H Bak

University of Edinburgh, UK

A Commentary on

Paap et al “Bilingual advantages in executive functioning either do not exist or are restricted to very specific and undetermined circumstances”

Submission to *Cortex* “Discussion Forum”

Address for correspondence:

Dr. Thomas H Bak

Human Cognitive Neuroscience

University of Edinburgh

Edinburgh EH8 9JZ

UK

Word count: 998 words (limit 1000)

References: 15 (limit 15)

Keywords: bilingualism, cognition, executive functions, immigration

Paap and colleagues put forward a clear and simple message: cognitive differences between bilinguals and monolinguals do not exist; papers proposing anything else are methodologically flawed or biased (Paap, Johnson, & Sawi, 2015). Their claims depend critically on two conditions: the representativity and quality of their discussion of the literature and the underlying assumption that all studies should produce the same results, independently of the population in which they were conducted. Unfortunately, their literature review omits a number of relevant studies and only touches the issue of potential population differences. While the authors discuss classical paradigms, such as Simon and flanker task, they seem to miss new developments, such as the introduction of the Test of Everyday Attention, which assesses inhibition as well as switching (Bak, Vega-Mendoza, & Sorace, 2014; Vega-Mendoza, West, Sorace, & Bak, 2015). The authors do not mention some of the largest studies in the field (despite their apparent preoccupation with group size), including studies in which confounding variables (another major concern of the authors) were carefully controlled for. This commentary focuses on topics particularly emphasised by Paap and colleagues: immigration, socio-economic status (SES) and culture; for a more comprehensive discussion of confounding variables in bilingualism studies, see Bak (in press).

I could not agree more with Paap and colleagues that immigration, SES and culture constitute important confounds in bilingualism research. In fact, I agree with them so much that I wish they would examine their own participants in this respect. As the authors state "*immigrant status is important because it is associated with higher intelligence*". Since intelligence has a well-documented hereditary component (Davies et al., 2011), one would expect that the "*healthy migrant effect*" would continue, at least partly, into next generations. As many bilingual participants tested by Paap and his colleagues (Paap et al, 2015) come from immigrant families, we should expect them to outperform monolinguals because of their immigrant background, independently of bilingualism. It would be interesting to examine why this is apparently not the case. Maybe the immigration effect is outweighed by socio-economic disadvantages: another variable unequally distributed in their sample, as illustrated by significant differences in parental education (Paap et al., 2015)? Moreover, their null-findings could also result from cultural differences disadvantaging participants with an immigrant/bilingual background. Confounding variables can operate both ways, producing spurious effects

but also masking genuine ones.

The immigration confound poses a formidable hurdle to bilingualism research in countries in which monolingualism is the norm and bilingualism is usually associated with recent newcomers. But it can be avoided in places in which this is not the case. In Israel, for instance, the majority of population of certain age is composed of immigrants. One of the largest longitudinal studies (n=814) of bilingualism and cognitive aging (Kavé, Eyal, Shorek, & Cohen-Mansfield, 2008), found a relationship between the number of languages spoken and performance on cognitive screening. Secondly, many European studies compared autochthonous mono- and bilinguals: a large (n=853) study of cognitive aging from Edinburgh (Bak, Nissan, Allerhand, & Deary, 2014), examining an ethnically and culturally homogenous sample and controlling for immigration, SES of both participants and their parents and even childhood intelligence, still found significant differences between mono- and bilinguals. Similar results were reported in cognitive aging (n=232) (Perquin et al., 2013) and dementia (n=134) (Woumans et al., 2014). Thirdly, in large parts of the world bilingualism is the rule rather than exception. With 255 million bilinguals (2001 Census), India offers an enormous potential for bilingualism research. A large (n=648) study of a non-immigrant population showed a delayed onset of dementia in bilinguals compared to monolinguals, with an even larger effect in illiterates (Alladi et al., 2013). Remarkably, none of the studies mentioned above has been cited by the authors.

A surprising feature in a paper with an emphasis on methodology is the liberal use of rather vague quantifiers such as “*sometimes*”. If “*bilingual advantages are **sometimes** supported by questionable statistics*” (Section 3.4), does it invalidate all studies with positive results? And importantly, does it imply that papers showing null effects are methodologically sound? In contrast to the tight scrutiny applied to studies reporting positive results, papers reporting negative results (and hence confirming authors’ expectations) do not undergo the same cross-examination. A case in point is Kirk et al (Kirk, Fiala, Scott-Brown, & Kempe, 2014), cited as an example of a study with matched immigration status, which finds no differences between mono- and bilinguals. Kirk et al should be congratulated for taking on the interesting but difficult question of potential similarities and differences between bilingualism and bidialectalism. However, their

group size is among the smallest in the field (n=16 per group) and the groups they compare are culturally as different as they can possibly be within the same country: industrial city of Dundee, remote, agricultural Outer Hebrides, metropolitan London and other regions of England. Indeed, a number of their monolingual subjects have recently moved from England to Scotland, raising the question whether they could be described as migrants, albeit within the same country.

Generally speaking, a simple division of evidence into positive and negative results might not do justice to the complexity of the existing data. In fact, many studies specifically include tasks in which no differences between bilingual and monolinguals are expected, in order to explore the specificity of possible bilingualism effects (Bak, Vega-Mendoza, et al., 2014; Vega-Mendoza et al., 2015).

With their passionate polemic and indefatigable engagement, Paap and colleagues have contributed to identifying methodological weaknesses of previous studies, making future ones more rigorous. But bilingualism research is moving on, incorporating criticisms, refining its methodology, broadening its scope beyond the Western World (Bak & Alladi, 2015) and developing theoretical models that take into account different patterns of language use, varying from individual to individual and from community to community (Green, 2011). Research has shown that even slight changes in experimental conditions can produce diverging results (Costa, Hernández, Costa-Faidella, & Sebastián-Gallés, 2009). The next challenge is to determine how different populations can produce diverging results too.

References:

- Alladi, S., Bak, T. H., Duggirala, V., Surampudi, B., Shailaja, M., Shukla, A. K., Kaul, S. (2013). Bilingualism delays age at onset of dementia, independent of education and immigration status. *Neurology*, 81(22), 1938-1944.
- Bak, T., & Alladi, S. (2015). Bilingualism, dementia and the tale of many variables: why we need to move beyond the Western World. *Cortex*, 10.1016/j.Cortex.2015.04.025.
- Bak, T. H. (in press). The impact of bilingualism on cognitive aging and dementia: finding a path through a forest of confounding variables. *Linguistic Approaches to Bilingualism (Special Issue: Bilingualism and Ageing)*.

- Bak, T. H., Nissan, J. J., Allerhand, M. M., & Deary, I. J. (2014). Does bilingualism influence cognitive ageing? *Annals of Neurology*.
- Bak, T. H., Vega-Mendoza, M., & Sorace, A. (2014). Never too late? An advantage on tests of auditory attention extends to late bilinguals. *Frontiers in Psychology*, 5: 485.
- Costa, A., Hernández, M., Costa-Faidella, J., & Sebastián-Gallés, N. (2009). On the bilingual advantage in conflict processing: Now you see it, now you don't. *Cognition*, 113(2), 135-149.
- Davies, G., Tenesa, A., Payton, A., Yang, J., Harris, S. E., Liewald, D., Luciano, M. (2011). Genome-wide association studies establish that human intelligence is highly heritable and polygenic. *Molecular Psychiatry*, 16(10), 996-1005.
- Green, D. W. (2011). Language control in different contexts: the behavioral ecology of bilingual speakers. *Frontiers in Psychology*, 2: 103.
- Kavé, G., Eyal, N., Shorek, A., & Cohen-Mansfield, J. (2008). Multilingualism and cognitive state in the oldest old. *Psychology and Aging*, 23(1), 70.
- Kirk, N. W., Fiala, L., Scott-Brown, K. C., & Kempe, V. (2014). No evidence for reduced Simon cost in elderly bilinguals and bidialectals. *Journal of Cognitive Psychology*, 26(6), 640-648.
- Paap, K., Bockelman, M., Johnson, H., Eusebio, E., Wagner, S., Avalos, A., & Sawi, O. (2015). *No bilingual advantages across five switching tasks*. Paper presented at the Bilingualism and Executive Function, New York (CUNY).
- Paap, K. R., Johnson, H. A., & Sawi, O. (2015). Bilingual advantages in executive functioning either do not exist or are restricted to very specific and undetermined circumstances. *Cortex*.
- Perquin, M., Vaillant, M., Schuller, A.-M., Pastore, J., Dartigues, J.-F., Lair, M.-L., Group, M. (2013). Lifelong exposure to multilingualism: new evidence to support cognitive reserve hypothesis. *PloS one*, 8(4), e62030.
- Vega-Mendoza, M., West, H., Sorace, A., & Bak, T. H. (2015). The impact of late, non-balanced bilingualism on cognitive performance. *Cognition*, 137, 40-46.
- Woumans, E., Santens, P., Sieben, A., Versijpt, J., Stevens, M., & Duyck, W. (2014). Bilingualism delays clinical manifestation of Alzheimer's disease. *Bilingualism: Language and Cognition*, Publication on-line 29 Dec 2014, 1-7.